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ABSTRACT

Learning at a distance can be challenging for preservice teacher education students living in remote rural sites. The Department of Special Education at Utah State University (USU) uses technology to overcome student isolation by linking students to supportive university learning communities. Many students in the USU distance education, special education certification program are nontraditional students--older, employed, with family commitments. Distance education provides convenient access to a university degree program in local communities but can be stressful for these students, who may lack college experience and self-confidence and need support. The USU program enhances student learning and support through the easy-to-use, low-cost, Internet-delivered Sorenson EnVision technology. EnVision is a teleconferencing system, using a unique compression technology to deliver voice and video over the Internet, even at very low data throughput rates. This technology allows face-to-face interaction among students and between students and university personnel in various learning and support situations. These situations include advising and mentoring students, tutoring individual students, conducting study group sessions, delivering didactic courses, supervising practical courses, and training local cooperating teachers. The EnVision technology is described, including multi-conferencing capability (linking one teacher to many sites), compatibility with NetMeeting software, simultaneous videoconferencing and document sharing, and hardware and software requirements. (SV)

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CREATING A COMMUNITY OF DISTANCE LEARNERS: PUTTING TECHNOLOGY TO WORK

Learning at a distance can be challenging for university preservice special education students living in rural sites located miles away from the university campus. Isolation and distance from peers, professors, and university resources combine to create a sense of "aloneness" for these students. The Department of Special Education at Utah State University (USU) is utilizing a variety of technology delivery systems in an effort to overcome this sense of "aloneness" by creating communities via technology. Distance education students are linked to a variety of supportive university learning communities through technology.

Creating Communities of Distance Learners

Many of the students enrolled in the USU distance education, special education degree/certification program live in remote rural areas located several hours from the main university campus. They attend classes via distance education at local branch campuses. Most students earn their entire university degree along with teacher certification without leaving their home communities. Distance education students enroll in the same classes as on campus students. Classes are delivered via a variety of distance education technologies, such as, a one-way video, two-way audio satellite delivery system; a two-way audio and video state compressed video EDNET system; and a two-way audio and video Internet delivery system, Sorenson Envision.

The majority of the students enrolled in the program are older than traditional on campus students, which is similar to enrollment in distance education programs in other states (Online, 1988). Most work at least part-time and have family commitments. University courses that do not require them to move or disrupt work and family situations are appealing, reflecting a preference of many adult learners (Miller, Smith, & Tilstone, 1998). Over 90% of the students in the USU program are female. This percentage is higher than the national average of female students enrolled in distance education programs. According to Bremner, 1998, 66% of the adult distance education students are female, and about 80% of those students have children.

The benefits of distance education programs for nontraditional students include access to a university degree program without disruption of work and family commitments, availability of courses in the evening, and convenient location of the courses (Matthews, 1999). An additional benefit for students in the USU program is the promise of improved employment opportunities. Utah, like many other states in the U. S., is facing a critical shortage of special education teachers (Lauritzen & Friedman, 1993). Students enrolled in the USU program

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most often end up employed as full-time special education teachers even before they complete the program and become certified to teach. Local school districts have become partners in the distance education program. Districts encourage uncertified personnel to enroll in the program, provide training opportunities, and recruit graduates. They have a vested interest in the success of the program. They are anxious to hire teachers who already have a commitment to the community, who are at a point in their lives where they want to establish a career path, and who are mature in age and experience.

Because students in program are employed and have family commitments, they face added pressures. Many are returning students who are not confident as university students and have never been distance learners. When added pressures of family and work are combined with a lack of confidence and experience and the isolation that distant learners experience, it is not hard to understand why students feel high levels of stress and even leave the program. Because university professors and advisers are not accessible in the local community, opportunities to increase interactions with students through the use of innovative technology has been explored and found to be helpful. The use of technology connections has also been helpful in bolstering the level of support students feel as they cope with stressful and challenging learning situations. Distant student learning and support have been enhanced through the use of an easy-to-use, low cost, Internet-delivered Sorenson EnVision technology connection.

Distance learners can become involved in multiple communities of learners via distance education systems that allow them to interact with university personnel as well as fellow students. Barth, 1997, advocates building communities of learners in school settings as a means of improving schools. The same concept of building communities of learners applies to distance education programs. Learners become members of the learning community by working together thus leading to improved learning. Technology allows that working together to happen. Examples of how distance learners are involved in various learning communities follow.

Advising and Mentoring Students

While it is not feasible to have a special education advisor at each site, special education degree/certification students at remote sites can receive program advisement and support via the EnVision technology. EnVision systems are placed at each USU community center. Students set up appointments to meet face-to-face with their advisers over the system. They are able to plan their programs, receive answers to questions, and explore solutions to problems. Being able to talk face-to-face enhances the interactions and connections between the adviser and students. Opportunities to interact are also increased due to the fact that the student doesn't have to wait for the adviser to make an advising trip to the community.

Tutoring Individual Students

On campus university professors usually have established office hours when students can come in for individual assistance and tutoring. Distance learners do not have that option and often feel that they are not part of the university learning community. They can obtain assistance by telephone or email, but do not have the opportunity to meet face-to-face with professors. The EnVision technology now provides an opportunity for that to happen. Because there are systems in each community and the connection is Internet-delivered, opportunities to meet face-to-face with professors are possible. EnVision systems can be placed on carts and moved from office to office as long as Internet connections are available. One system serves many professors.

One university professor provided this example. She was working with a student on an assignment to be completed by accessing professional journal articles from the university online library. The student had never accessed the online university library and was struggling with completing the assignment. The EnVision system was connected in the computer lab. The student pointed the camera over his shoulder, and the professor guided the student through the assignment, just as if the professor were in the computer lab looking over the student's shoulder.

Conducting Study Group Sessions

Students learning at a distance need support in the same way that students on campus need support. Students at a distance, however, do not have access to professors and fellow students in the same manner as students on campus. To provide an added level of support for students and build learning communities in remote sites, study groups are formed in each site to discuss course content, prepare for quizzes and tests, and answer student questions. In the past study groups were conducted by facilitators living in the remote sites and by professors who traveled to remote sites.

Professors are now using the Sorenson EnVision technology to hold study group sessions. Students are also able to link to each other and form student learning groups via the EnVision system. Because EnVision utilizes a direct, low cost Internet connection, access and scheduling are simplified. This increases the opportunities that remote students have to work together as learners. Students are no longer isolated in the remote sites. Students can also work on course assignments together through the EnVision application sharing capabilities.

Delivering Didactic Courses

By utilizing multiple Sorenson EnVision units, university professors teach to many remote student locations at the same time. Because Sorenson EnVision connections are made directly over the Internet, there is no third-party routing system involved. This eliminates the need to schedule course delivery time through third-party routing organizations. It is also greatly expands the time available for scheduling courses because only the originating and receiving sites must be available. Another added benefit is that professors are able to see all remote site students at the same time on monitors placed at the originating site. This increases the sense that the professor is teaching face-to-face to all students in all sites. Courses are taught in much the same manner as the more costly satellite and compressed video systems with the added benefit of seeing all students at the same time.

Supervising Practica Courses

USU Department of Special Education personnel use the Sorenson EnVision system to supervise students enrolled in university practica courses in remote sites. Students enrolled in the practica courses are required to teach students in public school classrooms. Supervision of the university students as they teach is difficult due to the fact that the practica sites are located in some instances more than four hours away from the university campus. By using the Sorenson EnVision technology, university professors are able to view practica students teaching in the remote site classroom from computers located in their offices and provide immediate feedback to them.

Opportunities to observe the practicing teachers are increased as well as the amount of feedback that they receive. The use of the technology is a cost and time effective method of providing feedback to practicing teachers. It also increases the likelihood that the teachers learn effective instructional skills and provide improved learning opportunities for the students they teach. Local schools also receive the benefit of added personnel that in the past only schools located near university campuses received. Local teachers are also able to develop a connection to the larger university learning community as they work collaboratively with university professors.

Training Local Cooperating Teachers

Cooperating teachers in remote sites need to be trained to work with university the special education practica students who learn to teach in their classrooms. In the past teachers had to leave their schools to come to the university to be trained. Utilizing the Sorenson EnVision system, professors train local teachers in their communities. This reduces time out of school and increases the opportunities for training sessions.

Sorenson EnVision Technology

Despite the development of new technologies designed to distribute information, the most effective way to teach and interact with students is still face-to-face. The Sorenson EnVision technology allows face-to-face interactions between teachers and students without ever having to leave the office or classroom.

Interactions are possible from a distance by using an Internet connection and the EnVision computer software, video capture card, camera, and microphone installed on a Windows personal computer (PC). The EnVision set up allows the capture, compression, and transmission of data needed to deliver video, voice, and application information to share PC programs. A media production facility can be utilized if: (a) media elements are added to the instruction; (b) multiple sites are involved in the instructional delivery; or (c) the teacher wants to see multiple sites simultaneously.

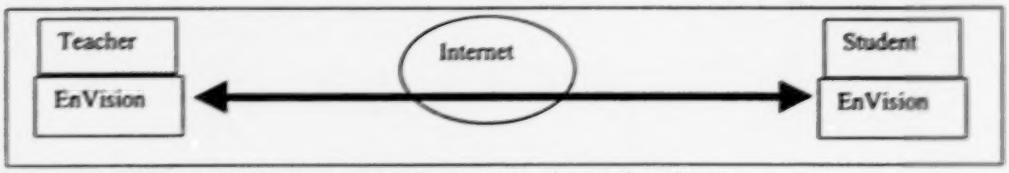

Figure 1. Illustration of the Endpoint connection between teacher and student.

Sorenson Vision manufactures the EnVision delivery system. EnVision is easy to use. It's also low in cost compared to other systems of less quality and network adaptability, which is vital for use on the Internet today. EnVision can be installed in a simple process that takes about 30 minutes for someone comfortable installing a PCI card in a computer. EnVision uses the Internet to transmit data so there are no hourly communications costs. Educational institutions and the remote student locations pay only for their Internet connections.

Current Ability of the Internet to Deliver Video and Voice

Efficiency in data transmission and reception is important because of Internet congestion (Comer, 1995). Bandwidth is a measure of ideal data transmission potential (in speed) not the actual data rate at any moment in time. Congestion on the Internet between any two points can limit the data rate and affect the quality of video and voice reception (Goralski, 1998). For these reasons, it's important that any videoconferencing system used for conversation be efficient at transmitting and receiving compressed video and voice. The system should be highly functional in a low throughput data transmission range.

EnVision operates with a unique compression technology. EnVision always attempts to accommodate the actual throughput and deliver good quality 15 frames per second video and robust voice performance. EnVision's flexibility to produce good video quality even at very low data throughput rates is especially valuable when conducting videoconferences to rural and international locations. Due to these complications, most videoconferencing system manufacturers do not claim that their products function well on the Internet. EnVision's manufacturer promotes EnVision's flexibility to transmit video and robust voice in very low data throughput environments, like the Internet. EnVision is not recommended for use with analog modems. The connection can be a DSL modem, cable modem, ISDN, Frame Relay, or any other digital modem with a data rate going both in and out of each site of 128 KBPS or higher.

Linking One Teacher to Many Sites

A Multi-Conferencing Unit or MCU is used to link one teacher to many remote student locations at the same time. EnVision combines with standard audio and video equipment to create an MCU. The reasons for this

are to: (a) simplify operation, (b) insure the highest possible video and voice quality to each site, and (c) maximize flexibility in data throughput rates for remote student sites. Using an MCU to connect remote sites with a teacher can be expanded to an unlimited number of sites as long as adequate physical facilities and throughput of data is available at the site where the MCU and usually the teacher is located.

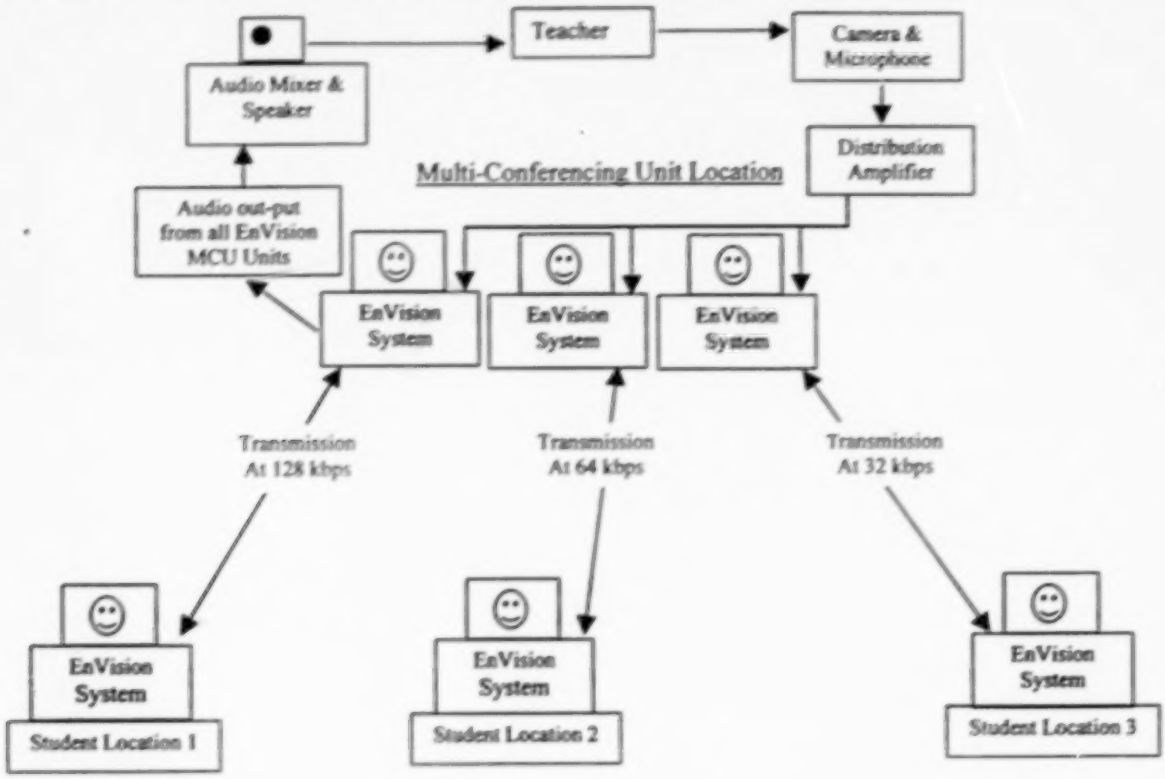

Figure 2. Graphic illustration of a multi-conferencing configuration.

A Windows PC with an EnVision system is required at each student location. Push-to-talk microphones or the use of the EnVision microphone mute button when students are not speaking is recommended to eliminate student site room noise. A large screen projector or television can be used at a student site if a large group of students attend. Any NTSC camera or multiple cameras can be used at a student location. Additional microphone options are also available from group tabletop models to wireless microphones. A wireless mic could be used with a student teacher moving around a classroom talking with students while being mentored from a remote location.

NetMeeting Compatibility

The EnVision system is also compatible with NetMeeting version 3.01. NetMeeting is standard software included in all Windows operating systems. NetMeeting version 3.01 can be used at student remote locations to receive the same video quality but not the enhanced voice quality delivered by EnVision. Remote sites with NetMeeting, a sound card, and microphone (but not a video capture card) can connect with a teacher using EnVision. The student will see and hear the teacher. The teacher will hear and be able to share documents with the student.

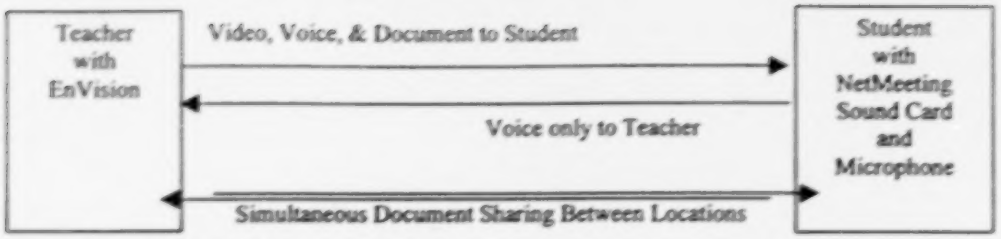
Teacher with EnVision
Video, Voice, & Document to Student
Voice only to Teacher
Simultaneous Document Sharing Between Locations
Student with NetMeeting Sound Card and Microphone

Figure 3. EnVision and NetMeeting connection.

Simultaneous Videoconferencing and Document Sharing

Once an EnVision call is connected, an adjustable window appears on the desktop with the picture and the voice of the person called. A white board can also be opened to view graphics and photos or create diagrams. Application sharing allows video conferencing participants to share any Windows PC program and to work together either within a program or on a whiteboard. The remote student location does not need to have the program that is being shared. For example a teacher could share a Microsoft PowerPoint document with a student during a call, even though the student PC does not have the Microsoft PowerPoint program installed. With EnVision the student is literally sharing the teacher's PC.

Sorenson Vision System Requirements

EnVision requires the use of a Windows PC. A Pentium PC or Celeron processor, 200 MHz or faster, is recommended.

Computer System Requirements for the EnVision Technology System

- Pentium 90 or faster processor or a Celeron processor
- Windows 95, 98 or NT
- Available PCI Slot
- 16 MB RAM (32 MB is recommended)
- 15 MB free hard disk space
- VGA/SVGA monitor with 16 bit color
- LAN / WAN or IP connection at a digital modem rate of 128 KBPS or faster.

EnVision Videoconferencing Kit Includes

- NTSC camera with video cable
- PCI card with audio/video processors
- H.323 EnVision Software CD
- Audio microphone and headset
- Jumper cables for use with existing sound card and speakers
- Collaboration software compatible with Microsoft NetMeeting
- Installation guide

The current price per unit is $735 with an Educational Discount. Information about purchasing Sorenson EnVision can be obtained by calling Dave Hansford at 801-461-9714 or on the web at hansford@s-vision.com. More information about EnVision and Sorenson Vision is available at www.s-vision.com

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